# D35

DLP™ VIDEO PROJECTOR

# RS-232C CONTROL SPECIFICATIONS

Document Revision 1.0 (16 June 2006)

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***Revision History:***

| Revision | Date | Software Version | Description of Change |
|---|---|---|---|
| 1.0 | 20 April 2004 | 2.48.55 F or higher | Initial version. |

# 1. Introduction

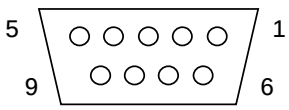
This document describes the communication and data formats used to control SIM2 D35 projector via RS-232C port.

# 2. Connection

Switch off your Personal Computer and Projector before connecting RS 232C cable.
Use a standard serial cable with 9 pin female to the Personal Computer and 9 pin male to the Projector: pin 2 connects to pin2, pin 3 to pin 3 and pin 5 to pin 5.
SIM2 D35 Port is described as follows.

***SIM2 D35 RS-232C Control Port:***

D-SUB 9-pin
(female)




| Pin No | Signal | Definition |
|---|---|---|
| 1 | N/A | Not used |
| 2 | TD | Transmit data |
| 3 | RD | Receive data |
| 4 | N/A | Not used |
| 5 | GND | Ground |
| 6 | N/A | Not used |
| 7 | N/A | Not used |
| 8 | N/A | Not used |
| 9 | N/A | Not used |

Switch on the Personal Computer and, after start up, switch on the Projector.

Load a suitable communication software onto your Personal Computer, and set the Serial Port Parameters as shown below.

***Communication Parameters:***

| Parameter | Value |
|---|---|
| Transfer Rate | 19200 bps |
| Data Bits | 8 |
| Parity Bit | None |
| Stop Bit | 1 |
| Flow Control | None |

Set Send Mode and Read Mode to HEX.

# 3. Communication Protocol

The communication protocol is packet oriented. Packets consists of Header and Payload.

There are two types of packets: Event and Operation.
The packet header size is fixed (7 bytes), while the packet payload type and content varies based on the type of packet: Event payload size is 6 bytes, while Operation payload size is 25 bytes.
The entire packet size is variable, being the sum of the fixed-size packet header and variable-sized packet payload: Event packet size is 13 bytes and Operation packet size is 32 bytes.

Each packet received by the projector is acknowledged with a return code:
- 06: Acknowledged with no error
- 15: Acknowledged, but an error has occurred.

## *Header*

All Packets use the same Packet Header format.
The Packet Header size is fixed at seven bytes.

| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| BE | EF | Packet Type | Packet Payload Size | | Packet Checksum (CRC) | |

**0xEFBE** is a fixed value that is used to insure packet alignment if there are partial packets received or byte lost. The ls-byte of the word 0xBE is sent first, then the ms-byte 0xEF.

The **Packet Type** is a number (a byte in length) that defines the type of data in the packet.

The **Packet Payload Size** is a number (two bytes) that defines the size of the payload portion of the packet.
For a given Packet Type, Packet Size is fixed.

The **Packet Checksum** (two bytes) is the CRC value for the entire packet (Header and Payload).

## *Payload*

The packet payload format depends on the packet type.
The Event packet payload size is 6 bytes, while the Operation packet payload size is 25 bytes.

### *Event Packet Format:*

| 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Event | | 00 | 00 | 00 | 00 |

### *Operation Packet Format:*

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Op Type | Operation ID | | 00 | 00 | Target | | Operation Value | | | | 00 | 00 |

| 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |

# 4. Commands

## *Remote Control Keycodes*

The following commands send simulated Remote Control input to SIM2 D35 projector.

***Remote Control Keycodes:***

| Key | Command |
|---|---|
| STAND BY | BE EF 02 06 00 51 E4 48 01 00 00 00 00 |
| 0 (1) | BE EF 02 06 00 6B E6 52 01 00 00 00 00 |
| 1 (2) | BE EF 02 06 00 80 E5 49 01 00 00 00 00 |
| 2 (2) | BE EF 02 06 00 B3 E5 4A 01 00 00 00 00 |
| 3 (2) | BE EF 02 06 00 62 E4 4B 01 00 00 00 00 |
| 4 (2) | BE EF 02 06 00 D5 E5 4C 01 00 00 00 00 |
| 5 (2) | BE EF 02 06 00 04 E4 4D 01 00 00 00 00 |
| 6 | BE EF 02 06 00 37 E4 4E 01 00 00 00 00 |
| 7 | BE EF 02 06 00 E6 E5 4F 01 00 00 00 00 |
| 8 | BE EF 02 06 00 89 E7 50 01 00 00 00 00 |
| 9 | BE EF 02 06 00 58 E6 51 01 00 00 00 00 |
| ESC | BE EF 02 06 00 0D E6 54 01 00 00 00 00 |
| CURSOR UP | BE EF 02 06 00 DC E7 55 01 00 00 00 00 |
| CURSOR LEFT | BE EF 02 06 00 EF E7 56 01 00 00 00 00 |
| CURSOR RIGHT | BE EF 02 06 00 3E E6 57 01 00 00 00 00 |
| CURSOR DOWN | BE EF 02 06 00 C1 E6 58 01 00 00 00 00 |
| MENU LEFT (-) | BE EF 02 06 00 10 E7 59 01 00 00 00 00 |
| MENU RIGHT (+) | BE EF 02 06 00 23 E7 5A 01 00 00 00 00 |
| FREEZE | BE EF 02 06 00 F2 E6 5B 01 00 00 00 00 |
| ZOOM | BE EF 02 06 00 94 E6 5D 01 00 00 00 00 |
| FOCUS | BE EF 02 06 00 76 E7 5F 01 00 00 00 00 |
| INFO | BE EF 02 06 00 A7 E6 5E 01 00 00 00 00 |
| AUTO | BE EF 02 06 00 79 E2 60 01 00 00 00 00 |
| ASPECT NORMAL | BE EF 02 06 00 2A F4 83 01 00 00 00 00 |
| ASPECT ANAMORPHIC | BE EF 02 06 00 9D F5 84 01 00 00 00 00 |
| ASPECT LETTERBOX | BE EF 02 06 00 4C F4 85 01 00 00 00 00 |
| ASPECT PANORAMIC | BE EF 02 06 00 7F F4 86 01 00 00 00 00 |
| ASPECT PIXEL TO PIXEL | BE EF 02 06 00 AE F5 87 01 00 00 00 00 |
| ASPECT USER 1 | BE EF 02 06 00 51 F5 88 01 00 00 00 00 |
| ASPECT USER 2 | BE EF 02 06 00 80 F4 89 01 00 00 00 00 |
| ASPECT USER 3 | BE EF 02 06 00 B3 F4 8A 01 00 00 00 00 |
| VCR | BE EF 02 06 00 9B E3 62 01 00 00 00 00 |

***Direct access codes***

| | |
|---|---|
| Goto Brightness | BE EF 02 06 00 C7 E1 7E 01 00 00 00 00 |
| Goto Contrast | BE EF 02 06 00 16 E0 7F 01 00 00 00 00 |
| Goto Color | BE EF 02 06 00 19 F4 80 01 00 00 00 00 |
| Goto Tint | BE EF 02 06 00 C8 F5 81 01 00 00 00 00 |

(1) When the unit is in Stand-by state, this command switches on the unit and the last source memorised prior to switch off is automatically selected.
(2) When the unit is in Stand-by state, this command switches on the unit and selects the corresponding Source.

## *Operation Codes*

The following codes provide direct access to SIM2 D35 User Interface operations not accessible via a single Remote Control command.

### *Operation Codes:*

| Operation | Action | Command |
|---|---|---|
| BRIGHTNESS | INCREMENT | BE EF 03 19 00 AB 7E 03 00 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 C5 D4 04 00 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| CONTRAST | INCREMENT | BE EF 03 19 00 3E 23 03 01 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 50 89 04 01 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| COLOR | INCREMENT | BE EF 03 19 00 C1 C7 03 02 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 AF 6D 04 02 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| TINT | INCREMENT | BE EF 03 19 00 54 9A 03 03 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 3A 30 04 03 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| SHARPNESS (Video) | INCREMENT | BE EF 03 19 00 7E 0C 03 04 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 10 A6 04 04 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| SHARPNESS FILTER | INCREMENT | BE EF 03 19 00 D4 C4 03 09 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 BA 6E 04 09 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| SHARPNESS MODE | SET VIDEO | BE EF 03 19 00 7A 80 01 60 02 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET GRAPHICS | BE EF 03 19 00 EA 41 01 60 02 00 00 00 00 00 00<br>01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| CINEMA MODE | SET OFF | BE EF 03 19 00 33 43 01 07 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET AUTO | BE EF 03 19 00 A3 82 01 07 08 00 00 00 00 00 00<br>01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| VIDEO TYPE | SET NORMAL | BE EF 03 19 00 A6 1E 01 06 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET VCR | BE EF 03 19 00 36 DF 01 06 08 00 00 00 00 00 00<br>01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| POSITION HORIZONTAL | INCREMENT | BE EF 03 19 00 55 BA 03 21 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 3B 10 04 21 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| POSITION VERTICAL | INCREMENT | BE EF 03 19 00 AA 5E 03 22 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 C4 F4 04 22 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| COLOR TEMPERATURE | SET HIGH | BE EF 03 19 00 CD 17 01 37 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET MEDIUM | BE EF 03 19 00 5D D6 01 37 08 00 00 00 00 00 00<br>01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET LOW | BE EF 03 19 00 AC 96 01 37 08 00 00 00 00 00 00<br>02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET USER | BE EF 03 19 00 3C 57 01 37 08 00 00 00 00 00 00<br>03 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |

| | | |
|---|---|---|
| GAMMA | SET FILM | BE EF 03 19 00 58 DA 01 27 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET VIDEO | BE EF 03 19 00 C8 1B 01 27 08 00 00 00 00 00 00<br>01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET GRAPHICS | BE EF 03 19 00 39 5B 01 27 08 00 00 00 00 00 00<br>02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| FREQUENCY | INCREMENT | BE EF 03 19 00 15 95 03 24 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 7B 3F 04 24 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| PHASE | INCREMENT | BE EF 03 19 00 80 C8 03 25 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 EE 62 04 25 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Y/C DELAY | INCREMENT | BE EF 03 19 00 7F 2C 03 26 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 11 86 04 26 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| MAGNIFICATION | INCREMENT | BE EF 03 19 00 FF 72 03 2C 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 91 D8 04 2C 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| PAN HORIZONTAL | INCREMENT | BE EF 03 19 00 6A 2F 03 2D 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 04 85 04 2D 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| PAN VERTICAL | INCREMENT | BE EF 03 19 00 95 CB 03 2E 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 FB 61 04 2E 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| KEYSTONE VERTICAL | INCREMENT | BE EF 03 19 00 01 26 03 1C 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 6F 8C 04 1C 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| KEYSTONE HORIZONTAL | INCREMENT | BE EF 03 19 00 6B 9F 03 1E 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 05 35 04 1E 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| LANGUAGE | SET ENGLISH | BE EF 03 19 00 15 35 01 05 24 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET ITALIANO | BE EF 03 19 00 85 F4 01 05 24 00 00 00 00 00 00<br>01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET FRANCAIS | BE EF 03 19 00 74 B4 01 05 24 00 00 00 00 00 00<br>02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET DEUTSCH | BE EF 03 19 00 E4 75 01 05 24 00 00 00 00 00 00<br>03 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET ESPANOL | BE EF 03 19 00 D6 37 01 05 24 00 00 00 00 00 00<br>04 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET PORTUGUES | BE EF 03 19 00 46 F6 01 05 24 00 00 00 00 00 00<br>05 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| OSD POSITION HORIZONTAL | INCREMENT | BE EF 03 19 00 82 88 03 61 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 EC 22 04 61 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| OSD POSITION VERTICAL | INCREMENT | BE EF 03 19 00 7D 6C 03 62 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | DECREMENT | BE EF 03 19 00 13 C6 04 62 08 00 00 00 00 00 00<br>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |

| | | |
|---|---|---|
| INPUT 3 (COMP. RGB) / SIGNAL TYPE | SET YCrCb AutoSync | BE EF 03 19 00 92 04 01 82 08 00 00 00 00 00 00<br>14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET YCrCb 15kHz | BE EF 03 19 00 5B 0C 01 82 08 00 00 00 00 00 00<br>08 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET YCrCb 32kHz | BE EF 03 19 00 51 06 01 82 08 00 00 00 00 00 00<br>10 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET RGB AutoSync | BE EF 03 19 00 97 01 01 82 08 00 00 00 00 00 00<br>18 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET RGB 15kHz | BE EF 03 19 00 5E 09 01 82 08 00 00 00 00 00 00<br>04 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| | SET RGB 32kHz | BE EF 03 19 00 98 0E 01 82 08 00 00 00 00 00 00<br>0C 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |

# 5. Examples

1. **Send the simulated "SWITCH ON FROM STAND-BY AND SELECT SOURCE" Remote Control keycode.**
   Remote Control allows Switching on from Stand-by via one of the keys "1", "2" ... "5".
   Send, for instance, the code relative to key "1": `BEEF02060080E5490100000000.`
   The projector switches on and selects Input 1.
   The projector returns the response code: `06` (Acknowledged with no error).
   **NOTE**: Commands that simulate keys "1", "2" ... "5" switch on the unit and select the corresponding Source.
   Command that simulate key 0 switches on the unit: the last source memorised prior to switch off is automatically selected.

2. **Send the simulated "MENU RIGHT" Remote Control keycode.**
   Send the packet: `BEEF02060023E75A0100000000.`
   The OnScreen Display appers on the screen.
   The projector returns the response code: `06` (Acknowledged with no error).

3. **Send the "SET ASPECT ANAMORPHIC" Operation Code.**
   Send the packet: `BEEF0206009DF5840100000000.`
   The Aspect Ratio changes to Anamorphic.
   The projector returns the response code: `06` (Acknowledged with no error).

4. **Select "INPUT 3 (COMP. RGB) WITH YcrCb 15kHz SIGNAL"**
   Send the packet: `BEEF0319005B0C0182080000000000000800000000000000000000000000000000`
   Wait for the return code and add an additional delay of 40 ms.
   Send the the code relative to the Key to which Input 3 has been assigned: for instance if the key is "3" the code is: `BEEF02060062E44B0100000000`

# 6. Warnings

When the number of bytes sent to the Projector is greater than indicated for the Command (32 bytes for Operation Packets and 13 bytes for Event Packets), excess data will be ignored.
Conversely, if number of bytes sent to the Projector is smaller than required by the Communication Protocol, an Error Code will be returned.
Allow a time interval of at least 40 ms between the Return Code and the following Command.